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COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE

VERBATIM RECORD OF THE THREE HUNDRED AND FORTY-EIGHTH MEETING

Held at Headquarters, New York,
on Wednesday, 13 June 1990, at 10.30 a.m.

Chairman: Mr. JANKOWITSCH (Austria)

- Spin-off benefits of space technology: review of current status (continued)
- Other matters
- Attendance by non-governmental organizations
- Organization of work

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The meeting was called to order at 11 a.m.

SPIN-OFF BENEFITS OF SPACE TECHNOLOGY: REVIEW OF CURRENT STATUS (continued)

Mr. GRIGORIEV (Union of Soviet Socialist Republics) (interpretation from Russian): The Committee is now considering a question of undoubted interest to all States members: Spin-off benefits of space technology. While the actual building of space technology is possible only for countries with great scientific and technological capabilities, the spin-off benefits, in one form or another, can be utilized, if not by all countries, at least by many.

What exactly are spin-off benefits? In our view they include all the ideas, processes, designs, technologies and methodologies created specifically to achieve high standards of quality for space rocket systems, and not originally intended for use for other purposes. Only later, when the main goal - launching a new space system, for example - had been achieved, did it become clear that many of these could be used successfully in the most varied fields, far removed from outer space.

(Mr. Grigoriev, USSR)

The level of space rocket technology achieved in our country is well known. Its spin-off effect can be seen in the application to various areas of the economy of new materials and special technological processes which were developed to produce rocket technology. The spin-off effect can also be seen in the use of space designs for other purposes.

In the current technically complicated Energia-Buran system approximately 80 per cent of its dry weight consists of new materials designed for space rockets. Their materials and technological processes are protected by more than 100 patents. Their use in other machinery and systems has made it possible to increase their durability and productivity while decreasing their volume and energy consumption.

For example, spherical containers used in space systems are made out of stainless steel which is cryogenically hardened at the temperature of liquid nitrogen and which has a strength of 180 kilograms of force per square millimetre. Plates of this steel are applied in surgical operations for setting compound fractures of the arms and legs, making it possible to enhance the quality and lessen the time for recovery, while copper buses developed for space equipment are used to make special instruments for neurosurgical operations.

Carbon-carbon and carbon-based construction materials used in the micromotors for orienting space equipment, with a long working life under high temperature conditions, are used for heating elements in electrothermal equipment. They last three to four times longer than graphite elements.

"Miniplen" fibreglass used in space equipment does not burn nor does it give off toxic products at temperatures up to 1,200°C. Its use as a non-combustible facing material for finishing the interiors of subway cars makes it possible to

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increase passenger safety in extreme situations. It can also be used for finishing the spaces in all kinds of industrial and manufacturing buildings.

Ceramics constructed for rocket technology are being used more and more in our economy. Electrically insulated ceramics are now used for electro-technical purposes, while aluminium oxide-based ceramics work well in the textile industry. Threading machinery made from this type of ceramics lasts three to five times longer than machines made of traditional materials such as porcelain and metals. The strength and quality of artificial fibres drawn through ceramic spinerettes are increased by 15 per cent to 20 per cent in the process.

Anti-friction, self-lubricating materials used in the motors of the Energia rocket maintain low friction at slip speeds of up to 100 metres per second and at high temperatures without lubricants. This hard lubricant material, called "Aftal", and special gaskets were used in designing fast-wearing joints of excavating machines, and that made it possible significantly to increasse the reliability and durability of those machines.

In order thermally to isolate the fuel tanks of the Energia rockets we developed a construction foam now used for building homes and factories. With the help of special equipment, the foam is used to fill in the joints of wall panels and the spaces in doors and window jambs, and this ensures that they will be hermetically sealed.

Highly effective permanent magnets used for the Energia rockets have been proposed for use in electronic technology and electrical engineering equipment, and they can possibly be used for high-speed transport with magnetic levitation. The magnets exceed the magnetic energy of ordinary magnets by 15 per cent to 20 per cent.

(Mr. Grigoriev, USSR)

Many of the newest technological processes coming out of the space rocket industry are successfully being applied in other areas of our economy. For example, technology and equipment for the rotational extraction of elements in the combustion chamber of liquid fuel engines and the application of anti-corrosion coatings have been used to make the tanks of food-processing machinery, and they have also been used in the chemical and medical industries.

Monitoring equipment for hermetically sealed joints in the pneumatic systems of rockets are used to monitor the hermetic sealing of gas pipes and also in the equipment used for gas-operated automobiles. Ultrasonic equipment to detect defects in the continuity and uniformity of welded seams in the rocket fuel tanks is now used in the food-processing industry and in the machine-building and energy and transportation fields.

I shall now say something about the use of products built for outer space but used for other purposes. We have already spoken about our space equipment called "Resource", which provides high-resolution photography of the Earth's surface. Now the ground retrieval of the photographic equipment and exposed film is done with special descent equipment in the form of a sphere 2.3 metres in diameter, shielded from the heat by a protective covering. It also has a braking rocket and parachute system. Many years of experience in using this equipment have shown its high reliability, while well-run industrial production has kept the cost relatively low. This all made us think about the advisability of using this space system for another purpose. The idea worked very well. The descent equipment originally designed for deploying cameras was modified, and began to be used for other purposes. That is how we got the Bion space equipment for biomedical research. The descent equipment was turned into a space laboratory containing different biological subjects, from one-celled organisms to monkeys.

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Conducting the experiments, preparing the subjects for flight, post-flight research and developing methodological materials were all undertaken by specialists from a number of Eastern European countries and also from the United States, France and the European Space Agency. Nine successful launches of the Bion equipment were carried out.

Another area has been developed with the use of this space equipment: materials production in outer space. Special space equipment called "Photon" was built and sent up six times, during which experimental technologies were worked out for the following areas: research into processes for obtaining various substances, alloys, composite and optic materials and so forth, and also medicinal compounds with new or improved characteristics; completing the work on technological processes for making semi-conductor materials under micro-gravity conditions; and completing the work on technological assemblies and systems for utilizing the results in the further development of industrial production in outer space. French and West German, as well as Soviet, equipment was used in these experiments. Substantial results at minimum costs are made possible by applying current space systems in other areas.

In conclusion, I should like to point out that all the spin-off effects that we have gained from space technology are accessible to other countries as well.

Mr. GUERRERO (Argentina) (interpretation from Spanish): Man's activity in outer space has evolved step by step, from a purely technological and exploratory approach at the beginning until the present day, where these activities can be considered viable on a commercial basis. What this means is that in the process of decision-making as to priorities in implementation, the cost-benefit analysis is evaluated at least in the same way as the scientific and technological results are determined.

(Mr. Guerrero, Argentina)

It would be inappropriate not to acknowledge that this methodology for achieving implementation has produced spectacular results, which we now call "spin-off benefits of space technology". This applies not only to basic space activity and research, but also to finished products or products derived in the same way which have now become part and parcel of our daily life. The miniaturization and possibilities for designing and obtaining composite materials appropriate for certain specific uses are no less promising for raising living standards here on Earth. This applies also to the production of pharmaceutical products in an environment of micro-gravity, which will ultimately be made possible by permanent space stations.

Listing and explaining all these strides is certainly very impressive and gratifying, when viewed objectively, as we consider everything that has become part and parcel of the patrimony of mankind.

Hand-in-hand with this we also note a promising and potentially fruitful event from the juridical point of view, which has indeed given rise to a new agenda item, namely, "Consideration of the legal aspects related to the application of the principle that the exploration and utilization of outer space should be carried out for the benefit and in the interests for all States, taking into particular account the needs of developing countries". In an initial approach to the matter, it would appear that we have identified the legal goal, that is to say, the spin-off benefits of space technology, at the same time as we have placed on the agenda the question of the need to legislate on the matter as a priority issue. In sum, we know what we must do.

However, we must take into account the obvious fact that man's activity in outer space has provided benefits in direct proportion to the investments made by those that are chiefly active in outer space. Indeed, it is also a fact that the

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implementation of national or regional space programmes is the outgrowth of carefully weighed decisions, with priority given to such activity over other needs facing a given country or region, which is done at an enormous cost, including even the sacrifice of human lives.

This first part of our statement would be incomplete if we failed to point out that it is also plain to see that the spin-off benefits of space technology are not accessible in equal measure to the entire international community. It remains for us, therefore, to discuss the matter of how to promote, facilitate and, in the end, make a reality of this process of extending such participation.

Before coming to grips with an analysis of the current state of affairs, our delegation intends to offer some practical thoughts which we believe will enhance our debate, inasmuch as we feel that these value judgement elements might contribute to bringing closer the positions of the various sides.

In principle, our delegation believes that in essence a process of participation implies a certain level of technology transfer. Without going so far as to consider the aspects involving methods of design, development or production, the simple use of these technologies cannot be conceived in an isolated context, bereft of content and not situated within a multidimensional and complex pattern or system. The complexity of all this flows not only from the political and socio-economic implications which the transfer of any technology currently entails, for example, the establishment of some new competency, juridical authority or other, but also because space technology is a cutting edge, a sophisticated technology.

If we analyse the transfer process alone we see that it allows for more than one approach. On the one hand, on the part of the candidates receiving such technology there is a tendency to aspire to the latest generation of technological

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developments. This in itself entails a substantial complication, because, generally speaking, the absorption of sophisticated technology presupposes infrastructure investment in terms of education, research and development.

Beyond that, with respect to those possessing this technology, even though there is the manifest readiness to transfer it, given, if nothing else, the need to create consumers for their goods in new markets, the lack of a reliable system to guarantee intellectual property rights and the difficulty of verifying the final use made of such technology, discourages transfer or leads to the adoption of control or monitoring measures which, far from coping with the substantive problem, namely, the improper use of transferred technology, only produces unwanted discriminatory effects, such as the self-relegation to the sidelines of countries, with a consequent loss of opportunity in terms of also transferring accumulated experience.

(Mr. Guerrero, Argentina)

If we further delve into an analysis of the matter, we note the difficulty we run into as we try effectively and efficiently to channel a technological process. This happens due to the fact that the countries that have the capacity to receive such techology normally are the ones which do not require it because they already have their own substitute technology, whereas the ones that do need such technology do not have the means to pay for acquiring it.

It is idle to point out that the system feeds on itself, inasmuch as the lack of appropriate technology means that patterns of production cannot be improved, something which in the end translates into a lack of ability to pay.

As we analyse the current situation, we see a reorganization of economic systems with an obvious reinvestment of capital from systems of production oriented towards labour intensity, and towards patterns of production that rely to a great degree on technology, with high emphasis placed on quality. These systems are meant to secure new technologies and to transfer them into goods that can be sold, subject to financial transactions and with an economic impact in terms of the balance of payments of the countries concerned. This tendency is perfectly verifiable in outer space as well, if we take a look only at the budgets and the number of new members that have joined the outer space club. We also envisage an evolution of the kind that we might call moving from a "civilization of material things", where space technology is perhaps the most impressive product, towards a "civilization of life", where the same technology would appear with a dual identity, being on the one hand the best way to ensure that our planet is a more livable place, and being, on the other hand, a danger that would flow from any negligent or irresponsible use of such technology.

During this phase, where we find particularly striking a growing interest in familiarizing oneself with and rationally managing the integral living body that is our planet and its inhabitants, we also note a lack of preparation for attuning

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ourselves to the rules of operation of a free-market economy. This grows out of the fact that the people suitable for identifying appropriate spin-off products, preparing same, adapting them for use and making them available to their end users, under circumstances where competence and quality are assured in advance, just do not exist. For instance, countries that face severe attendance problems in their educational system, where pupils must come in to given educational institutions, but where there is a lack of classrooms, a dearth of teachers and a high rate of absenteeism, would appear not in a position now to adopt technological solutions, involving multimedia systems, thoroughly tested in commercial practice, bringing education via television to distant consumers.

No less stark is the situation in terms of the monitoring of non-renewable natural resources by remote sensors and their use in decision-making. I have in mind here just two cases of spin-offs from space activity where the participation of the international community is penalized by the reality of a world which prefers to live with problems it cannot solve rather than to implement solutions it has not yet completely understood.

The depolarization of the international scene, sought as something desirable for all, for years now, requires under current circumstances bold and imaginative initiatives, such as may contribute to the process of détente. However, we must seek a realistic position from which, keeping our feet on the ground, we can raise our minds up to the stars.

In the opinion of this delegation, such a position could include explicitly delineated standards which, far from limiting the right of some countries to come up with their own developments and to make their own investments pay off for themselves, and also far from impeding the access of other countries to technological facilities and resources, applying in the process discriminatory criteria of whatever kind, would instead provide a recognized, accepted and

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applicable system which would reconcile convergent interests and common goals, making possible a case-by-case approach.

Our delegation has taken careful note of the various initiatives spelled out by other delegations or agencies, initiatives aimed at adopting some system which would serve as a benchmark and as a framework for man's activities in outer space. Beyond that, what has for all practical purposes become an integral part of our ways of thinking about things is the fact that in the decade still ahead, perhaps not research and exploration but certainly the exploitation of outer space by but one single country will be quite simply unthinkable.

The futility of any approach based on some dichotomy, along the lines of there being haves and have nots, to the issue of how to reconcile asymmetrical political, economic and social interests in the process of participating in the benefits of the spin-offs to be derived, prompts us to think that the greatest challenge we are facing, and at the same time the greatest contribution we can make to seeing to it that this process of change will be, instead, a harmonious transition, is for us to accept the task of building a new foundation, of coming up with a new way of thinking.

In this vein, then, we must start to look for machinery and methods that would make it possible to channel the spin-offs of outer space technology, including interaction, co-ordination and the potential inherent in our concerting of efforts, in establishing ties among countries, public and private organizations, and even individuals, thus making it possible to render technology more accessible and setting up systems of financing and training and ways of using resources to solve specific problems.

Mr. PERRI (Brazil): My delegation would like to make a few remarks on its understanding of the deliberations under the item before us, regarding spin-off benefits of space technology. As in all other items, in considering item 8 this Committee should not lose sight of the main purpose of its work, which is to strengthen and enhance international co-operation in the exploration and uses of outer space for peaceful purposes.

We are thus ready to examine the proposals put forward by some delegations, particularly the delegation of the United States, on possible initiatives related to the spin-off benefits of space activities that might be undertaken by the Programme on Space Applications without prejudice to the current activities undertaken in the light of implementation of UNISPACE-82.

We should like to stress that in dealing with the spin-off benefits of space technology we should not limit our discussion and the scope of eventual activities related to the subject to an exchange of information on such spin-offs. We should above all examine and deliberate on ways of assuring international co-operation in this field also through, inter alia, study of the possibilities of giving access to such technologies to all nations, particularly the developing countries.

In this context, if we are to contribute constructively and realistically to our main endeavour of strengthening and enhancing international co-operation in the exploration and peaceful uses of outer space, special attention should be given to those spin-offs which can have an impact in addressing the urgent and pressing social and economic needs of developing countries.

The CHAIRMAN: I call on the representative of the United Nations Disaster Relief Organization.

Mr. SCOTT (Office of the United Nations Disaster Relief Co-ordinator (UNDRO)): The Office of the United Nations Disaster Relief Co-ordinator is pleased at the attention that the Committee on the Peaceful Uses of Outer Space has given and continues to give to disaster mitigation and prevention. On behalf of UNDRO I thank the Chairman for the opportunity to address the Committee today.

As members are aware, UNDRO is the specialized office of the Secretary-General responsible for all disaster-related matters. One of its main functions is to mobilize, direct and co-ordinate external assistance provided by the United Nations system in response to disasters. UNDRO also promotes pre-disaster planning as well as the study, prevention, control and prediction of natural disasters.

These mandates can best be fulfilled only by taking advantage of the increasing benefits of space technology, in particular services offered by fixed and mobile geosynchronous communications satellites, low-earth-orbit communications satellites and remote sensing satellites. This Committee should be complimented for encouraging international co-operation in the development and application of these technologies peacefully and for peaceful purposes.

Aware of this, UNDRO recently convened an international conference on disaster communications. Eighty-three participants from 54 organizations gathered in Geneva from 19 to 21 March 1990 and discussed the use of telecommunications and remote sensing technology for disaster relief, preparedness and prevention. Participants included telecommunications equipment manufacturers, service providers and experts from the international disaster management community. This conference marked an important initiative of UNDRO during the International Decade for Natural Disaster Reduction.

The three-day event included presentations on mobile and fixed satellite systems and related ground hardware, cellular and remote sensing systems, United

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Nations institutional roles and responsibilities and case studies on the use of these technologies in disaster management.

Discussion focused on such issues as the need to establish international agreements aimed at facilitating entry and exit and operations of communications equipment by relief teams in stricken countries.

The conference was organized by the Public Service Satellite Consortium, a private non-profit organization based in Washington, DC, and funding was provided by a grant to UNDRO from the Federal Republic of Germany. The conference produced a statement of recommendations and priorities, unanimously endorsed, that will provide direction during the decade for disaster communications planning. It also identified major communications needs of the international disaster management community. Both texts are reproduced in the printed copy of this presentation, as is the conference agenda and work schedule. At this time I will read out only the recommendations.

These are the recommendations made to UNDRO by the conference participants:

"The use of state-of-the-art communication and remote sensing technology for disaster preparedness, response and mitigation and the enhanced resistance of national and international communication systems to natural disasters are of vital importance to the actual reduction in the impact of disaster events.

"Consistent with UNDRO's mandate and the needs identified in the preceding pages, the conference participants, by consensus, make the following recommendations:

"UNDRO, with the support and co-operation of the International Decade for Natural Disaster Reduction framework, should:

"1. Take the leadership role in obtaining international agreements facilitating entry and exit and operation of communications equipment by relief teams in stricken countries;

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"2. Promote international agreements on the use of appropriate terrestrial and satellite frequencies and services for disaster operations in co-operation with ITU, as required;

"3. Identify criteria for priority access to communications frequencies for emergency use, and obtain agreements on priority access procedures;

"4. Within the framework of the International Decade for Natural Disaster Reduction, UNDRO should contribute to ensuring that the benefits of disaster communications and remote sensing technologies be made available to countries so that they can develop or improve their own disaster-resistant communications infrastructure and, ultimately, manage their own mitigation efforts.

"5. In co-operation with entities concerned, develop, maintain and update centralized clearing-house for the collection and dissemination of accurate and timely information about telecommunications and remote sensing technology applicable to disaster management, including an inventory of parameters and availability of equipment in countries at risk and from other countries and institutions engaged in disaster relief operations;

"6. Facilitate and expand the training of disaster management personnel in the use of telecommunications and remote sensing technologies;

"7. Establish the information networking necessary to ensure that accurate information, including damage and casualty assessment, is disseminated in a timely manner;

"8. Support local efforts to ensure that an effective interface exists between a country's internal communications and its communications with other countries and institutions involved in disaster relief operations. This would then enable the effective co-ordination and dissemination of information concerned with disaster relief operations.

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"9. Develop its own in-house technical resource to provide, within hours, essential telecommunications capability in support of disaster relief operations;

"10. Negotiate with domestic and international communications carriers for more favourable tariff structures than presently exist for communications capacity during response efforts to major disasters;

"11. Develop philosophy and approach to payment for communications services required in disaster management efforts.

"12. Encourage countries to inventory their satellite and terrestrial telecommunications and remote sensing hardware to establish their availability for disaster management purposes;

"13. Request ITU's assistance, where applicable, in establishing the process for protocols and standards for disaster communications operations and in other areas of ITU competence."

Representatives of the international amateur radio community attending the conference offered their services to UNDRO in the event that all communications were lost in the affected areas and until UNDRO established its own communications.

The need for substantial financial resources for the implementation of the outlined recommendations was acknowledged. In line with the resolution on the International Decade for Natural Disaster Reduction, the conference participants urged that the international community, including Governments, donor organizations, the private sector and other sources, make the necessary funds available.

(Mr. Scott, UNDRO)

UNDRO would like to take this opportunity to commend the dedication of the participants of the International Conference on Disaster Communications and the organizations and Governments they represented. UNDRO also commends the work of the Committee on the Peaceful Uses of Outer Space and looks forward to continued and increased co-operation with and participation in its activities. We invite its consideration of the recommendations that have come from the recent Conference on Disaster Communications.

The CHAIRMAN: In concluding the Committee's consideration of this agenda item we shall now have the benefit of the first of two presentations on this subject proposed to the Committee, namely, a special presentation by Mr. Leonard Ault, Deputy Director of the Technology Utilization Division of the Office of Commercial Programs of the National Aeronautics and Space Administration of the United States (NASA), on spin-off benefits of space technology.

Mr. AULT (United States of America): One year ago today, I had the pleasure of appearing before this Committee to provide an overview of a number of spin-offs of space technology which have resulted from the United States space research and development programmes - spin-offs that have increased industrial and economic progress, and materially affected the quality of life enjoyed by all peoples. At that time, I also briefly reviewed the various methods which National Aeronautics and Space Administration (NASA) employs in stimulating the transfer of its advanced technologies into meaningful and tangible application and use here on Earth.

I appreciate the invitation to again address this Committee on this area of significant concern. This year, I would like to focus attention on results of the transfer process - namely, the many spin-offs which have occurred - rather than the technology transfer process itself.

Before doing so, however, I believe it is important to point out that the technology transfer process itself is an exceedingly complex one, which relies in large measure on participation and co-operation of creators and users of technology alike. Among the many factors on which successful technology transfer rests are value judgements and assessments, economic conditions, decisions on costs and benefits of adoption, market considerations, availability of investment resources, and a host of other variables. In fact, in view of the wide range of such complex and variable factors which influence the technology transfer process, as well as the many people and organizations involved, it is truly remarkable that technology transfer occurs at all. It has been NASA's experience, however, that despite the many potential pitfalls and blind alleys that may occur in the process, well developed programmes to actively promote the transfer and use of technology do pay off.

(Mr. Ault, United States)

Today, I would like to describe for the Committee a number of space technology spin-offs examples which have spawned a wide range of new consumer products and industrial processes of almost every description. Space technology has found its way into many areas of economic and human concern: in health and medicine, public safety, the environment, industrial manufacturing and productivity, as well as agriculture and education.

Let me start with several examples in the field of health and medicine.

The field of health and medicine, as I noted last year, has been a particularly fertile area for the application and use of advanced space technology. New methods for medical treatment and diagnostics have been advanced through the development of biomedical devices and analytical systems. The first spin-off example is one such device.

NASA has developed an ingestible temperature pill which will enable physicians to more accurately treat such emergency conditions as dangerously low or dangerously high body temperatures. Extreme accuracy of temperature measurements and readings is important in treating such cases as hypothermia. The so-called "Temperature Pill", developed by NASA and the Johns Hopkins Applied Physics Laboratory, is accurate to one one-hundredth of a degree, and is the only means of obtaining deep body core temperatures known to the medical community. The device - which is three quarters of an inch, or 1.9 centimetres in length - incorporates several aerospace technologies, such as integrated circuit miniaturization, sensor and microbattery developments, and telemetry technology, a method for transmitting coded data signals to Earth from orbiting spacecraft.

Currently, NASA and the Johns Hopkins Applied Physics Laboratory are working on an advanced four-channel, ingestible capsule that will simultaneously monitor temperature, heart rate, inner body pressure and acidity. When complete, the new

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ingestible capsule may make significant contributions to the medical diagnostics field.

Let me now turn to another example. It is estimated that over 15 million cathode ray tube - or CRT personal computers - operate in the United States alone, and the number is growing rapidly. Widespread use of CRT terminals, however, poses an occupational hazard for many people.

In a survey of CRT users, conducted several years ago, 95 per cent of those interviewed complained about screen glare and 65 per cent cited specific problems, including blurred vision, itching, burning eyes, eyestrain, fatigue and headaches.

A high efficiency, anti-reflection coating, developed to coat the windows of manned spacecraft such as Gemini, Apollo and now the space shuttle, has been applied in a wide-range of commercial retrofit anti-glare filters for use on personal computers. The coating minimizes the reflected brightness to which the human eye is most sensitive. In addition to glare reduction, the filter enhances image-to-background contrast, higher resolution and improved readability. The same NASA-developed formulation is now being directly applied to cathode ray tubes in assembly-line manufacturing.

(Mr. Ault, United States)

A portable X-ray instrument is now being produced commercially as an industrial tool to detect minute cracks or flaws in quality control product inspection. The same device may soon find broader use as a medical diagnostic system. The LIXISCOPE, which stands for Low Intensity X-ray Imaging Scope, is a self-contained, battery powered fluoroscope that produces an instant image through the use of a small amount of Iodine-123, a short half-life radioisotope. It is designed to utilize less than 1 per cent of the radiation normally required by conventional X-ray systems.

The LIXISCOPE, which was developed at the NASA Goddard Space Flight Center in Green Belt, Maryland, is finding growing acceptance as an industrial tool used mostly for rapid non-destructive testing to measure product flaws without waiting for development of X-ray film.

The unit's portability allows for emergency use in situations where immediate fluoroscopic examination is needed - for example, in emergency-room examination where possible bone injuries may be indicated.

Computer programmes developed for space applications have been especially useful in the fields of manufacturing and construction. Here, for example, we can see a crawler lifting crane, one of a line of similar products manufactured by FMC Corporation in Cedar Rapids, Iowa. The company conducts extensive proof-lift tests and computer analyses to ensure that their large cranes can safely lift rated-capacity loads up to 1 million pounds over a wide range of applications. Computer software developed by NASA, called Analysis of Beam Columns, increased FMC's crane analysis capabilities to a much higher level of sophistication. This NASA programme enabled company engineers to more accurately determine bending moments, deflections and critical loads for latticed crane booms, and saved the company countless hours in developing their own improved analytical system.

(Mr. Ault, United States)

NASA coatings research also has led to the development of dry film lubricants which offer exceptional wearability and friction-resistance for spacecraft components, especially in the harsh interplanetary environment - where temperatures can range from well below zero to over 500 degrees Fahrenheit. Space-age dry lubricant materials are now routinely used by industry for many applications - such as bearings, sleeves and raceways, used in industrial robots, where repetitive movements require special care to extend their useful life.

Last year I described an improved breathing system for firefighters, based on portable life support technology developed for NASA for Apollo astronauts. Similar efforts have been undertaken by NASA in conjunction with the United States Fire Administration to find additional applications of space technology to increase the margin of safety for firemen.

In one project, NASA helped develop an entirely new firefighter's ensemble, from new protective headgear down to improved footwear - an ensemble which offers maximum protection and greater ease of movement. Shown here are two versions of the improved NASA firefigher's wearing apparel based on NASA technology.

A major focus of NASA's efforts in this project involved the application of lightweight, fire resistant, heat-protective materials originally designed for astronauts' space suits or spacecraft components. Careful attention was also given by NASA to the design and selection of materials for the turnout coat, gloves, boots, helmet and face shields. The prototype equipment was thoroughly tested by NASA for heat, impact, and cut and penetration resistance before being released for field evaluation.

Several years ago, the United States Fire Administration conducted field tests at 14 municipal fire departments nationwide. Since completion of those tests, a

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number of the prototype ensemble components have been commercialized and are now widely available for use by fire department personnel both here and abroad.

Let me now shift to the environmental field.

With the rapid growth of many of our cities in recent years, the management of wastewater run-off and sewage treatment capacity has been a constant headache for city engineers and municipal officials alike. To provide better information on sewage line distribution, flow rate and system capacity, the American Digital Systems Company, in Huntsville, Alabama, developed a highly accurate monitoring system that measures sewage volume and flow rates on a continuous, real-time basis. The new measurement system called "sewer mouse", is installed in strategic locations throughout a city's sewer system, and flow-rate data received at a central point enables city engineers to more accurately design treatment facilities and expansion of city sewage distribution systems.

The "sewer mouse" incorporates new space technology advances in electronics and sensor technology, as well as data acquisition and telemetry systems developed by NASA for satellite operations. Major cities in the United States, including Washington, Baltimore, St. Louis and Oakland, California, now use the space-age "sewer mouse" on a routine basis.

NASA laboratories conduct extensive research in coatings and materials for protection of spacecraft systems from the harsh environment of space. A new class of polyamide materials, developed by NASA in the mid-1980s, has shown significant promise in protecting outdoor bronze statuary from harsh weather conditions and environmental pollutants, such as acid rain. Here, a researcher at the Getty Conservation Institute in California is shown investigating the properties of a NASA-developed polymer coating on a bronze test specimen.

(Mr. Ault, United States)

In last year's presentation, I briefly mentioned another similar protective system developed by NASA - a corrosion-resistant coating, used in the refurbishment of the Statue of Liberty in preparation for her 100th birthday several years ago. To conclude my remarks and with the Committee's approval, I would like to show a short videotape illustrating the use of this NASA technological advancement.

A videotape was shown.

Mr. AULT (United States of America): I would like to add a postscript to the videotape which you have just seen.

The Pennsylvania company which commercialized the NASA protective coating, has recently extended its application to an even wider range of commercial and industrial use - including bridge structures, antennas, seagoing vessels and offshore oil platforms. Of special interestg, this space-age coating was recently chosen to protect the Po Lin Buddha, a giant all-steel structure being constructed in Hong Kong, China.

Before concluding my remarks, I should like to invite representatives to obtain a copy of "Spin-off", an annual report produced by NASA, which is available at the back of the Conference Room.

In conclusion, let me say that the United States is firmly committed to meet the many challenges which space exploration offers in the 1990s and beyond. Moreover, as we continue to pursue meaningful goals in space science and engineering, we feel confident that our efforts to transfer and exploit useful technologies here on Earth will yield significant and far-reaching dividends for the benefit of all mankind.

The CHAIRMAN: Although, as previously announced, there will be a second presentation on spin-off benefits at this afternoon's meeting, by the delegation of the USSR, we have now concluded the substantive consideration of agenda item 8.

OTHER MATTERS

Mr. HODGKINS (United States of America): We should like to raise two matters briefly. The first concerns the medium-term plan. In his statement earlier, the Secretary of the Committee mentioned that the medium-term plan was working its way through the United Nations system and that some changes had been made. We wish to request that some time before the end of this session the current medium-term plan, as revised, be distributed to members for their information, since we considered it last year, and, as I noted earlier, some changes have been made.

The second matter concerns the question of observers, which you mentioned earlier in the meeting, Mr. Chairman. We have one general question concerning observer status, and perhaps the secretariat could shed more light on it. We understand that before a non-governmental organization is granted observer status it must be accredited by the United Nations. It is also our understanding that the International Law Association and the International Society for Photogrammetry and Remote Sensing are non-governmental organizations for the purpose of being granted observer status. We assume that the present observers have that same status. Perhaps the Secretariat could confirm that.

With regard to the general question of how we approach observer status for non-governmental organizations in the future, we think that one of the criteria should specifically be their status as non-governmental organizations vis-á-vis the United Nations.

ATTENDANCE BY NON-GOVERNMENTAL ORGANIZATIONS

The CHAIRMAN: I think we should be able to come to a decision at this session on the request submitted to us by the International Law Association and the International Society for Photogrammetry and Remote Sensing, thus possibly enriching the circle of those non-governmental organizations that have, in their various fields, provided valuable support to this Committee in some of its areas of work.

Concerning the point just raised by the representative of the United States, those two organizations do have non-governmental organization observer status, as provided by Article 71 of the Charter of the United Nations.

If I hear no objection to the granting of observer status to the International Law Association and the International Society for Photogrammetry and Remote Sensing, I shall take it that the Committee decides to do so.

It was so decided.

ORGANIZATION OF WORK

The CHAIRMAN: Does any other delegation wish to speak on agenda item 9, bearing in mind the request made to the Secretariat by the representative of the United States? As that is not the case, I wish to remind members that at the opening of this afternoon's meeting we shall have the benefit of a short technical presentation by the delegation of the Soviet Union on spin-off benefits. We shall conclude consideration of agenda item 9 and then proceed immediately, as announced in the Journal, to the consideration of our draft report in a closed meeting, as is our custom.

Before adjourning the meeting, I should like to repeat our thanks to Mr. Ault for his interesting presentation.

The meeting rose at 12.15 p.m.